Sustainable Prosperity

Carbon Pricing Brief #2 – Policy Design Considerations

The previous note (First Principles) summarized the rationale for pricing carbon, and the main policy approaches available to implement it. This note will review key policy design criteria and considerations, and how they differ across approaches. *This is a summary note. Further details on particular points can be provided on request*.

Stringency

The stringency of a carbon pricing policy is the level of change it requires for covered sources. In a cap & trade (or intensity-based) system, stringency is the size and pace of the emission reduction commitment. In a tax system, stringency is the level of the tax and its rate of increase over time. More stringency produces a higher carbon price and greater reductions, all else equal. For firms, stringency is the impact of the policy on the marginal costs of production.

Coverage

Coverage refers to who (or what) is subject to the carbon price. In other words, which greenhouse gases, sectors and entities are part of the system. Together with stringency, it defines the policy's emission reduction ambition. Wider coverage across *all* of these dimensions enables a more ambitious reduction goal. Broader coverage also typically delivers a more cost-effective policy (by sharing the burden more broadly).

Revenue generation and recycling

Carbon pricing approaches can create a public revenue stream, through the tax mechanism or the auctioning of emission allowances.[1] In a cap-and-trade system, a government has many options: (1) *Full coverage and ramp-up of auctioning*: start by covering all major emissions sources ("economy-wide"), but allocate all or most of the allowances for free, and gradually auction a greater percentage over time; (2) *Full auctioning and ramp-up of coverage*: start with 100% auctioning but slowly expand the coverage of sectors under the system; or (3) *Mixed*: begin with only certain sectors with free allowances to some or all of these, then ramp up both coverage and percentage of allowances auctioned. Quebec's cap-and-trade system takes this approach. It initially covered the industrial and power sectors, starting with mostly free allowances and moving to 100% auctioned over time; but since Jan. 1st it now also covers fuel distributors (i.e. all retail fuel use), who must buy 100% of their allowances.

Carbon pricing systems can generate substantial revenues (e.g. BC's carbon tax generated C$1.1 billion in 2012/13). Governments have many choices for how to allocate those revenues, including: using them to offset other taxes (as BC does), rebating the revenues directly to the covered entities, or by investing in carbon-reducing infrastructure, technologies or projects (as Alberta and Quebec do).

Ontario's existing law (Bill 185, 2009) describes to which purposes the revenues raised by a carbon price can be put. In broad terms, those purposes are: (i) research, development and deployment of GHG reducing technologies, (ii) mitigating the costs of the policy to covered sectors, (iii) investing in low carbon infrastructure or equipment in covered sectors, or (iv) mitigating the costs to electricity consumers. That legislation, of course, could be modified.

[1] A TPS can also generate revenue, if it is complemented by an in lieu-of-fee type of system as is the case in Alberta.

The use of carbon revenues plays a large role in determining the ultimate cost-effectiveness of the policy. Research generally suggests that reducing other distortionary taxes can provide the most cost-effective outcome (this "revenue neutral" approach is used by B.C.). Combining tax cuts with targeted support for clean technology or infrastructure, if well designed, can also be very effective.

Distributional impacts (households)

Some studies suggest that a carbon price may disproportionately affect low-income households, since they spend a larger part of their income on energy[2] (although this may not be the case in Ontario, since its electricity system is largely decarbonized). To mitigate any such impacts, governments can use carbon revenues to compensate those disproportionately affected. In B.C., for example, the government has created tax credits for low-income households and rural communities as compensation (using about 23% of total carbon revenues).

Competitiveness impacts

Similarly, certain sectors of the economy can be disproportionately affected by a carbon price. The best known test for such competitiveness concerns is the "energy-intensive and trade-exposed" (EITE) test that has featured in U.S. policy development.[3] Trade exposure is a bigger issue if competitors are not subject to carbon pricing or emission limits. Even for EITE sectors, studies and experience indicate that competitiveness impacts are typically small, for current carbon prices (under $30/tonne) – although there can be exceptions. Sustainable Prosperity's Policy Brief "Carbon Exposed or Carbon Advantaged?" examines this issue in more detail, considering impacts on *all* sectors.[4]

Governments can use compensating policy measures to address competitiveness concerns. A commonly-used approach, in a cap-and-trade system, is to provide some (or all) free allowances to EITE sectors initially – as Quebec's system does. Alberta's intensity-based system similarly charges firms only for emissions over their limit; and it provides an upper limit on costs by allowing the option of contributing to a technology fund at a rate of $15/t. A tax system can also address competitiveness concerns, for example, by recycling revenues to assist EITE firms (e.g. through targeted tax cuts or clean technology incentives).

If governments choose to buffer EITE firms from high carbon costs in the short-term (when they have little ability to adjust), they may want to combine that with a longer-term transition strategy to help EITE firms adjust, innovate and compete in increasingly carbon-constrained global markets. This can be done several ways, for example: by reducing the percentage of free allowances over time (as the EU and Quebec do), to provide growing incentive to change; or by using some carbon revenues to support the development and use of cleaner technologies, as Alberta does.

Jurisdictional linkages

It is possible to link carbon pricing systems between jurisdictions. Such linkage is simplest between cap-and-trade jurisdictions, through trading of emission allowances. An example of such linkage is the Quebec-California system. Linking is also theoretically possible between other carbon pricing systems, although the complexity is greatly increased by the need to convert from one type of carbon unit (e.g. tax) to another. The

[2] More in-depth studies indicate this is not necessarily the case; it depends on factors like carbon intensity of the electricity system and income sources. BC's carbon tax, for example, may benefit low income households even without the tax shift. (Beck et al., 2014)
[3] Ontario sectors that may meet the EITE test include streel, chemicals and possibly cement (see the brief in Note 4 below).
[4] http://www.sustainableprosperity.ca/article3421

great advantage of linking systems comes from the gains from trade that are generated, with a greater pool and supply of allowances creating lower prices. Since any reduction in emissions, regardless of its location, contributes to mitigating climate change, the ability to link delivers economic benefits (lower overall reduction costs) without sacrificing environmental effectiveness.

A significant implication of linking carbon systems is that – because the marginal cost of emission reductions will equalize across jurisdictions – the participants are effectively agreeing to a common level of stringency.

Offsets

Offsets are measurable emission reduction activities that occur outside of the sectors directly covered by a carbon pricing policy, but which can be "brought into" the system for compliance purposes. Offsets typically involve displacing an emitting activity (e.g. renewable power projects by uncovered firms) or capture of carbon emissions (e.g. forest planting or conservation). Both Alberta and Quebec's systems allow for offsets. BC's system does not (though they *can* be used with carbon taxes). Offsets can (i) reduce the costs of GHG reduction by providing greater flexibility, and (ii) bring in activities not normally covered by carbon pricing (like forestry and agriculture) in a voluntary way. However, offsets also present certain challenges – such as ensuring reductions are permanent, real and additional - but these are not insurmountable.

Targeting price or quantity?

A carbon tax fixes the *price* of emitting GHGs, while a cap-and-trade system fixes the *quantity* of emissions allowed. Each has certain advantages. In particular, a cap ensures that an overall emission target will be met, while a tax does not. But a tax does provide a predictable carbon price (especially when rates are set on a multi-year basis, as BC did); this helps firms and households to make carbon-lowering investments (in cars, technologies, etc.) with greater certainty. Prices can fluctuate, sometimes widely, in a cap-and-trade system (as has been the case in Europe), creating uncertainty for low carbon investments.

In addition, a tax may provide a more predictable stream of revenue, particularly in the early years, which can help in planning for revenue recycling (tax cuts, incentives, investments).

It is possible to manage some of those trade-offs by bringing in elements of each policy in a hybrid system, or through smart design like price floors and ceilings in a cap & trade system (as Quebec does).

Administrative issues

Generally speaking, a carbon tax system is easier to develop (and administer) because it builds on existing tax administration and management systems. This means that carbon pricing, and revenues, can begin sooner. The BC carbon tax, for example, was announced in February, 2008 and implemented on July 1 that same year.

Cap-and-trade systems typically require longer to establish (e.g. to negotiate emission targets with sectors and firms, and create new systems for administration and monitoring). In Ontario, this may be less of an issue, since trading, monitoring and reporting systems have already been initiated, and the province and firms have some prior experience with emissions trading.

In any event, there are ways to address this problem, such as starting with a fixed price system for the first years, while cap & trade details are developed (this can also address issues of price volatility and revenue generation in early years).

Further information is provided in the following table which compares carbon pricing approaches across a range of relevant policy considerations.

Criterion	Carbon tax (fee)	Cap-and-trade system	Tradable performance standard
Cost-effectiveness	Achievable in principle as long as tax is applied uniformly across all sources	Achievable in principle as long as cap uniformly covers all sources and trading across all sources is allowed	Encourages cost-effective choices regarding direct emissions but may not increase downstream product prices to reflect carbon content. Does not encourage cost-effective choices among downstream products.
Emissions certainty	Emissions at regulated sources will vary with economic shocks as well as specific technology shocks that mitigation costs. Tax rate adjustment may be needed to bring emissions in line with goals.	Cumulative emissions will be certain across regulated sources.	Emissions will fluctuate with the level of input or output used to define the emissions rate.
Price/cost certainty	Prices remain predictable based on government schedules.	Price will fluctuate in response to changing conditions and, importantly, any uncertainty about future caps.	Price will fluctuate in response to changing conditions and, importantly, any uncertainty about future emissions rate targets. Exactly how a rate versus a cap affects price and cost certainty is unclear.
Equity and distribution	Prices throughout the economy will adjust to reflect the price of carbon to direct emitters and all the downstream customers who buy products that involve carbon emissions in their production. Put another way, the perceived cost of the carbon tax will include not just the mitigation cost, but also the value of all the carbon that is emitted. This value will come to the government in the form of tax revenue that can be re-distributed—but it is unlikely to affect the perceived carbon cost.	Similar to a tax, prices throughout the economy will adjust to reflect the price of carbon to direct emitters and all the downstream customers who buy products that involve carbon emissions in their production. The main difference is that the value of the emitted carbon will go to the entities receiving the initial allowance allocation. These entities could include the government (if allowances are auctioned) or other stakeholders (emitting sources or downstream consumers) if they are given allowances for free or if they are designated a baseline emissions target from which only deviations pay (receive) a price.	By design, power prices only increase on the basis of mitigation costs to meet the performance standard. They do not rise to reflect the price of all embedded carbon as in a mass-based carbon-pricing scheme. Downstream consumers observe almost no price increase (and, in the short run, carbon-intensive product prices can fall). Compared with a tax or C&T system, the standard has much smaller distributional consequences (and, relatedly, no tax revenue or allowance value to distribute).

Taken from: Brian Murray, Tim Profeta, and Billy Pizer; "Assessing Carbon-Pricing Policy Options in the United States"; Nicholas Institute for Environmental Policy Solutions, Working Paper NI-WP 14-09, November 2014.